

Semester 2 Final Exam Review

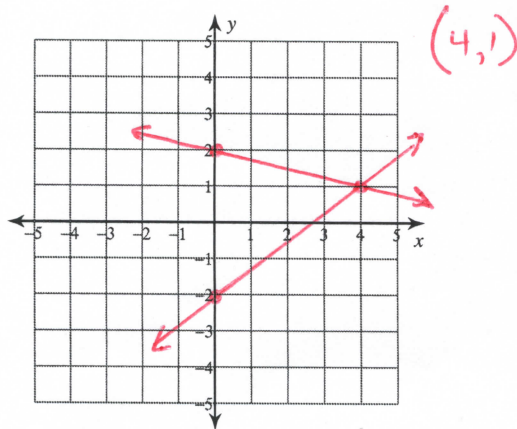
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Date _____ Period _____

Solve each system by graphing.

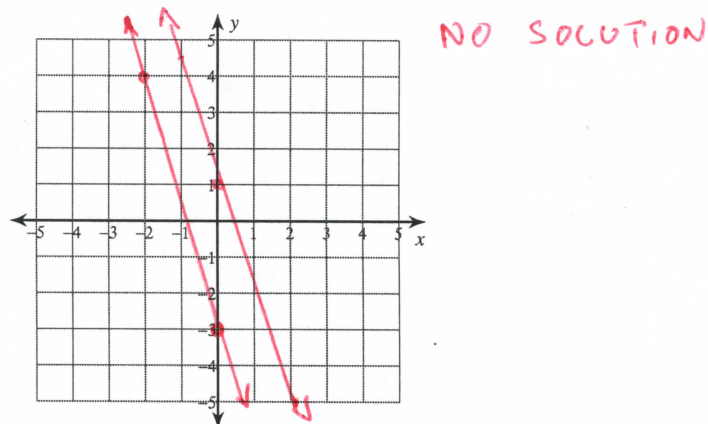
$$1) y = -\frac{1}{4}x + 2 \quad m = -\frac{1}{4} \quad b = 2$$

$$y = \frac{3}{4}x - 2 \quad m = \frac{3}{4} \quad b = -2$$



$$2) y = -\frac{7}{2}x - 3 \quad m = -\frac{7}{2} \quad b = -3$$

$$y = -\frac{7}{2}x + 1 \quad m = -\frac{7}{2} \quad b = 1$$



Solve each system by elimination.

$$3) \begin{array}{r} -5x + 10y = -30 \\ + \quad 5x - 10y = 30 \\ \hline 0 = 0 \end{array}$$

INFINITE NUMBER
OF SOLUTIONS

$$4) \begin{array}{r} 7x - 7y = 16 \\ + \quad -7x + 7y = -14 \\ \hline 0 = 2 \end{array}$$

NO SOLUTION
 $0 \neq 2$

$$5) \begin{array}{r} 5x - 8y = 29 \\ + \quad -5x - 2y = 1 \\ \hline -10y = 30 \\ \hline y = -3 \end{array}$$

(1, -3)

$$\begin{array}{r} 5x - 8(-3) = 29 \\ 5x + 24 = 29 \\ -24 \quad -24 \\ \hline 5x = 5 \\ \hline x = 1 \end{array}$$

$$6) \begin{array}{r} 5x - y = -6 \\ - \quad (6x - y = -8) \\ \hline -x = 2 \\ \hline x = -2 \end{array}$$

(-2, -4)

$$\begin{array}{r} 5(-2) - y = -6 \\ -10 - y = -6 \\ +10 \quad +10 \\ \hline -y = 4 \\ \hline y = -4 \end{array}$$

$$7) \begin{array}{r} -8x - 4y = 8 \quad \times 3 \\ 9x - 3y = -9 \quad \times 4 \\ \hline -24x - 12y = 24 \\ + \quad -36x + 12y = 36 \\ \hline -60x = 60 \\ \hline x = -1 \end{array}$$

(-1, 0)

$$\begin{array}{r} 9(-1) - 3y = -9 \\ -9 - 3y = -9 \\ +9 \quad +9 \\ \hline -3y = 0 \\ \hline y = 0 \end{array}$$

$$8) \begin{array}{r} 8x - 5y = 20 \quad \times 4 \\ -6x + 4y = -16 \quad \times 5 \\ \hline 32x - 20y = 80 \\ + \quad -30x + 20y = -80 \\ \hline 2x = 0 \\ \hline x = 0 \end{array}$$

(0, -4)

$$\begin{array}{r} 8(0) - 5y = 20 \\ -5y = 20 \\ \hline -5 \quad -5 \\ \hline y = -4 \end{array}$$

How many solutions does the system have?

9) $y = 4x + 3$ $m = 4$ $b = 3$
 $y = 4x - 4$ $m = 4$ $b = -4$

10) $y = \frac{1}{3}x - 2$ $m = \frac{1}{3}$ LINES INTERSECT,
 $y = -\frac{1}{3}x - 4$ $m = -\frac{1}{3}$ ONE SOLUTION

PARALLEL LINES (SAME SLOPE)
 DIFFERENT INTERCEPTS **NO SOLUTION**

Simplify. Your answer should contain only positive exponents.

11) $4x^3 \cdot 4x^3 \cdot 2x^4 y^2$
 $= 32x^{10}y^2$

12) $a^3 b^0 \cdot 3ba^{-4} = 3a^{-1}b = \frac{3b}{a}$

13) $\frac{y^{-1}}{2x^3} = \frac{1}{2x^3y}$

14) $\frac{4a^{-4}b^3}{3a^2} = \frac{4b^3}{3a^6}$

15) $(4x^{-4}y^4)^3 = 4^3 x^{-12} y^{12}$
 $= \frac{64y^{12}}{x^{12}}$

16) $(4x^4y^0)^2 = 4^2 x^8 = 16x^8$

Exponential Functions:

17) Solve for x: $3 \cdot 2^x = 12$ ~~3~~ $x = 2$
 $2^x = 4$

18) Bacteria grow at a rate of $40 \cdot 2^t$ where t is the number of 10-minute time periods. How many bacteria will there be in 60 minutes?

$40 \cdot 2^6 = 40 \cdot 64 = 2560$ bacteria

Simplify each sum.

19) $(4k - 1 - 3k^4) + (4k^2 + 4 + 5k)$
 $+ 5k + 4$ $4k^2$
 $9k + 3 - 3k^4 + 4k^2 = -3k^4 + 4k^2 + 9k + 3$

20) $(7x + 7x^2 - 6) + (3x + 4x^2 + 8)$
 $3x + 4x^2 + 8$
 $10x + 11x^2 + 2 = 11x^2 + 10x + 2$

Simplify each difference.

21) $(3p^4 + 4p + 7p^3) - (8p^4 + 4p + 2p^3)$
 $- 8p^4 - 4p - 2p^3$
 $- 5p^4 + 5p^3$

22) $(8 + 8m^2 - 8m^3) - (7m^3 + 1 + 4m^2)$
 $- 1 - 4m^2 - 7m^3$
 $- 15m^3 + 4m^2 + 7$

Find each product.

23) $(3m+4)(7m-4)$

$21m^2 - 12m + 28m - 16$

$21m^2 + 16m - 16$

	$3m+4$
$7m$	$21m^2 + 28m$
-4	$-12m - 16$

24) $(x+6)(x-5)$

$x^2 - 5x + 6x - 30$

$x^2 + x - 30$

25) $(2n-6)(n^2-5n-7)$

$2n^3 - 10n^2 - 14n$

$-6n^2 + 30n + 42$

	$n^2 - 5n - 7$
$2n$	$2n^3 - 10n^2 - 14n$
-6	$-6n^2 + 30n + 42$

$2n^3 - 16n^2 + 16n + 42$

26) $(5b-8)(5b+8)$

$25b^2 - 64$

	$5b - 8$
$5b$	$25b^2 - 40b$
$+8$	$+40b - 64$

Factor the common factor out of each expression.

27) $36x^9 + 18x^5 - 45x^4$

$9x^4(4x^5 + 2x - 5)$

28) $-9m^4 + 30m^2 + 6m$

$3m(-3m^3 + 10m + 2)$

Factor each completely.

29) $n^2 - 4n + 3$

$(n-3)(n-1)$

30) $x^2 - 2x - 80$

$(x-10)(x+8)$

31) $x^2 - 4x - 12$

$(x-6)(x+2)$

32) $7n^2 - 62n - 9$

~~$(7n-63)(n-9)$~~

$7n^2 - 63n + 1n - 9$

$(7n^2 - 63n) + (1n - 9)$

$7n(n-9) + 1(n-9)$

$(7n+1)(n-9)$

-63	-62
$-63, 1$	

$$33) 3x^2 + 14x + 8$$

$$\begin{array}{r} +24 \quad +14 \\ \hline 2, 12 \end{array}$$

$$\frac{(3x+2)(3x+12)}{3}$$

$$(3x+2)(x+4)$$

$$34) 4k^2 + 12k + 9$$

$$\begin{array}{r} +36 \quad +12 \\ \hline 6, 6 \end{array}$$

$$4k^2 + 6k + 6k + 9$$

$$(4k^2 + 6k) + (6k + 9)$$

$$2k(2k+3) + 3(2k+3)$$

$$(2k+3)(2k+3) = (2k+3)^2$$

$$35) 2x^2 - 13x - 20$$

$$\begin{array}{r} -40 \quad -13 \\ \hline 1 \quad -40 \quad -39 \\ 2 \quad -20 \quad -18 \\ 4 \quad -10 \quad -6 \\ 5 \quad -8 \quad -3 \end{array}$$

PRIME

$$36) p^2 + 4p + 4$$

$$(p+2)(p+2) = (p+2)^2$$

DIFFERENCE OF 2 SQUARES

$$37) m^2 - 16$$

$$(m+4)(m-4)$$

DIFFERENCE OF 2 SQUARES

$$38) 4n^2 - 9$$

$$(2n+3)(2n-3)$$

Solve each equation by factoring.

$$39) (n+1)(3n-1) = 0$$

$$\begin{array}{r} n+1=0 \\ -1 \quad -1 \\ \hline n = -1 \end{array}$$

$$\begin{array}{r} 3n-1=0 \\ +1 \quad +1 \\ \hline 3n = 1 \\ \frac{1}{3} \quad \frac{1}{3} \\ \hline n = \frac{1}{3} \end{array}$$

$$40) x(x-4) = 0$$

$$\begin{array}{r} x=0 \\ \hline \end{array}$$

$$\begin{array}{r} x-4=0 \\ +4 \quad +4 \\ \hline x = 4 \end{array}$$

$$41) b^2 + 2b - 8 = 0$$

$$(b+4)(b-2) = 0$$

$$\begin{array}{r} b+4=0 \\ -4 \quad -4 \\ \hline b = -4 \end{array}$$

$$\begin{array}{r} b-2=0 \\ +2 \quad +2 \\ \hline b = 2 \end{array}$$

$$42) v^2 - 10v + 16 = 0$$

$$(v-2)(v-8) = 0$$

$$\begin{array}{r} v-2=0 \\ +2 \quad +2 \\ \hline v = 2 \end{array}$$

$$\begin{array}{r} v-8=0 \\ +8 \quad +8 \\ \hline v = 8 \end{array}$$

$$43) 2x^2 + x - 6 = 0 \quad \begin{array}{r} +12 \\ -3+4 \end{array} \quad +1$$

$$(2x-3)(x+2) = 0$$

$$\begin{array}{l} 2x-3=0 \\ +3 \quad +3 \\ \hline 2x = 3 \\ \frac{2x}{2} = \frac{3}{2} \\ \hline x = \frac{3}{2} \end{array} \quad \begin{array}{l} x+2=0 \\ -2 \quad -2 \\ \hline x = -2 \end{array}$$

$$44) 4n^2 - 15n + 9 = 0 \quad \begin{array}{r} 36 \\ -3-12 \end{array} \quad -15$$

$$(4n-3)(n-3) = 0$$

$$\begin{array}{l} 4n-3=0 \\ +3 \quad +3 \\ \hline 4n = 3 \\ \frac{4n}{4} = \frac{3}{4} \\ \hline n = \frac{3}{4} \end{array} \quad \begin{array}{l} n-3=0 \\ +3 \quad +3 \\ \hline n = 3 \end{array}$$

Write a quadratic equation in standard form from the given solutions.

$$45) \{3, -5\}$$

$$(x-3)(x+5) = 0$$

$$x^2 + 5x - 3x - 15 = 0$$

$$x^2 + 2x - 15 = 0$$

$$46) \{-1, 4\}$$

$$(x+1)(x-4) = 0$$

$$x^2 - 4x + 1x - 4 = 0$$

$$x^2 - 3x - 4 = 0$$

Find the discriminant, and state the number of solutions.

$$47) -p^2 - 8p + 20 = 0 \quad b^2 - 4ac$$

$$(-8)^2 - 4(-1)(20)$$

$$64 + 80 = 144 \quad \text{two SOLUTIONS}$$

$$48) x^2 - 4x + 4 = 0$$

$$(-4)^2 - 4(1)(4)$$

$$16 - 16 = 0 \quad \text{1 SOLUTION}$$

Solve each equation with the quadratic formula.

$$49) 10p^2 + 11p - 17 = 0$$

$$\begin{array}{l} a=10 \\ b=11 \\ c=-17 \end{array} \quad x = \frac{-11 \pm \sqrt{11^2 - 4(10)(-17)}}{2(10)}$$

$$x = \frac{-11 \pm \sqrt{121 + 680}}{20}$$

$$x = \frac{-11 \pm \sqrt{801}}{20} = \frac{-11 \pm 28.3}{20}$$

$$x = \frac{-11 + 28.3}{20} \quad x = \frac{-11 - 28.3}{20}$$

$$x = 0.87 \quad x = -1.97$$

$$50) x^2 - 10x - 119 = 0$$

$$\begin{array}{l} a=1 \\ b=-10 \\ c=-119 \end{array} \quad x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(-119)}}{2(1)}$$

$$x = \frac{10 \pm \sqrt{576}}{2}$$

$$x = \frac{10 \pm 24}{2}$$

$$x = \frac{10+24}{2} \quad x = \frac{10-24}{2}$$

$$x = 17 \quad x = -7$$

Find the vertex of the quadratic equation.

$$51) y = 2x^2 + 6 \quad AOS = \frac{-b}{2a} = \frac{0}{4}$$

$$\begin{array}{l} a=2 \\ b=0 \\ c=6 \end{array} \quad y = 2(0)^2 + 6$$

$$= +6$$

$$(0, 6)$$

$$52) y = x^2 + 12x - 32 \quad AOS = \frac{-b}{2a} = \frac{-12}{2} = -6$$

$$\begin{array}{l} a=1 \\ b=12 \end{array} \quad y = (-6)^2 + 12(-6) - 32$$

$$= 36 - 72 - 32$$

$$= -68$$

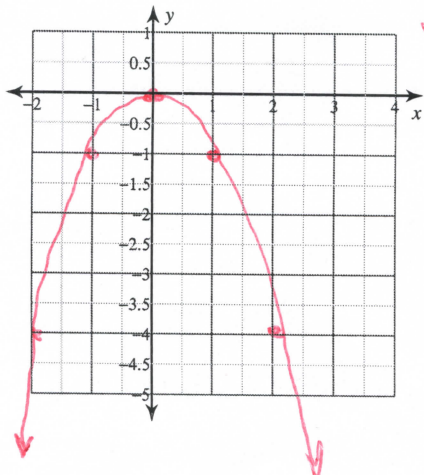
$$(-6, -68)$$

Sketch the graph of each function.

53) $y = -x^2$

$AOS = 0$

Vertex $(0,0)$

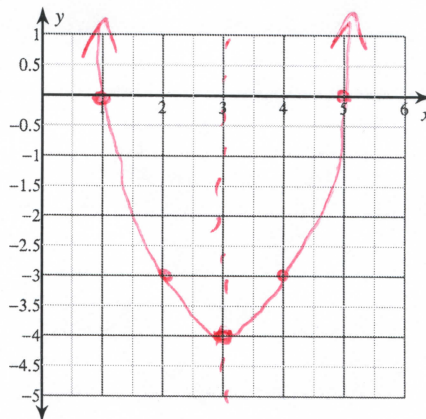


x	y
1	-1
2	-4

54) $y = x^2 - 6x + 5$

$AOS = \frac{-(-6)}{2(1)} = \frac{6}{2} = 3$

Vertex $(3, -4)$



x	y
2	-3
1	0

Simplify.

55) $\sqrt{448} = 2 \cdot 4 \sqrt{7} = 8\sqrt{7}$

56) $\sqrt{125} = 5\sqrt{5}$

57) $\sqrt{80p^2} = 4p\sqrt{5}$

58) $3\sqrt{15} \cdot 3\sqrt{12} = 9\sqrt{180} = 9 \cdot 3 \cdot 2\sqrt{5} = 54\sqrt{5}$

Solve each equation.

59) $\sqrt{b+1} = 5$
 $(\sqrt{b+1})^2 = 5^2$
 $b+1 = 25$
 $-1 \quad -1$
 $b = 24$

60) $17 = 9 + \sqrt{n+5}$

$17 = 9 + \sqrt{n+5}$
 $-9 \quad -9$

$8 = \sqrt{n+5}$

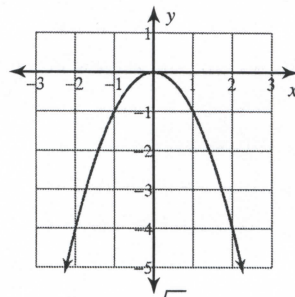
$8^2 = (\sqrt{n+5})^2$

$64 = n+5$
 $-5 \quad -5$

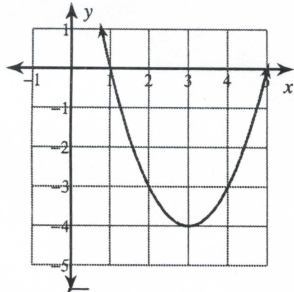
$59 = n$

Answers to Semester 2 Final Exam Review

- | | | |
|--------------------------------------|-------------------------------------|---------------------------------|
| 1) (4, 1) | 2) No solution | 3) Infinite number of solutions |
| 4) No solution | 5) (1, -3) | 6) (-2, -4) |
| 8) (0, -4) | 9) No solution | 7) (-1, 0) |
| 12) $\frac{3b}{a}$ | 13) $\frac{1}{2yx^3}$ | 10) One solution |
| 16) $16x^8$ | 17) 2 | 14) $\frac{4b^3}{3a^6}$ |
| 19) $-3k^4 + 4k^2 + 9k + 3$ | 20) $11x^2 + 10x + 2$ | 15) $\frac{64y^{12}}{x^{12}}$ |
| 22) $-15m^3 + 4m^2 + 7$ | 23) $21m^2 + 16m - 16$ | 18) 2560 bacteria |
| 25) $2n^3 - 16n^2 + 16n + 42$ | 26) $25b^2 - 64$ | 21) $-5p^4 + 5p^3$ |
| 28) $3m(-3m^3 + 10m + 2)$ | 29) $(n-3)(n-1)$ | 24) $x^2 + x - 30$ |
| 31) $(x-6)(x+2)$ | 32) $(7n+1)(n-9)$ | 27) $9x^4(4x^5 + 2x - 5)$ |
| 35) Prime | 36) $(p+2)^2$ | 30) $(x+8)(x-10)$ |
| 39) $\left\{-1, \frac{1}{3}\right\}$ | 40) {4, 0} | 33) $(3x+2)(x+4)$ |
| 43) $\left\{\frac{3}{2}, -2\right\}$ | 44) $\left\{\frac{3}{4}, 3\right\}$ | 34) $(2k+3)^2$ |
| 47) 12; two solutions | 48) 0; one solution | 37) $(m+4)(m-4)$ |
| 51) (0, 6) | 52) (-6, 76) | 38) $(2n+3)(2n-3)$ |
| | (-6, -68) | 42) {8, 2} |
| | | 45) $x^2 + 2x - 15$ |
| | | 46) $x^2 - 3x - 4$ |
| | | 49) {0.865, -1.965} |
| | | 50) {17, -7} |
| | | 53) |



54)



55) $8\sqrt{7}$

56) $5\sqrt{5}$

57) $4p\sqrt{5}$

58) $54\sqrt{5}$

59) {24}

60) {59}